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MCLEAN, VA 22102-3833

EXAMINER

MCGUTHRY BANKS, TIMA MICHELE

ART UNIT	PAPER NUMBER
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1793

NOTIFICATION DATE	DELIVERY MODE
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04/29/2009

ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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Office Action Summary	Application No. 10/587,469	Applicant(s) DRY ET AL.	
	Examiner TIMA M. MCGUTHRY-BANKS	Art Unit 1793	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 03 February 2009.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-22 and 24-38 is/are pending in the application.
- 4a) Of the above claim(s) 23 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-22, 24, 26-31 and 33-38 is/are rejected.
- 7) ☒ Claim(s) 25 and 32 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Status of Claims

Claims 1-4, 12, 13, 18, 19, 22, 24, 25 and 32 are as originally filed, Claims 5-11, 14-17, 20, 21, 26-31, 33-37 are currently amended and Claim 38 is new.

Election/Restrictions

Claim 23 is withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected invention, there being no allowable generic or linking claim. Election was made **without** traverse in the reply filed on 2/3/2009.

Priority

Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

Specification

The incorporation of essential material in the specification by reference to an unpublished U.S. application, foreign application or patent, or to a publication is improper. Applicant is required to amend the disclosure to include the material incorporated by reference, if the material is relied upon to overcome any objection, rejection, or other requirement imposed by the Office. The amendment must be accompanied by a statement executed by the applicant, or a practitioner representing

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the applicant, stating that the material being inserted is the material previously incorporated by reference and that the amendment contains no new matter. 37 CFR 1.57(f).

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claim 10 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 11 contains the trademark/trade name Hlsmelt. Where a trademark or trade name is used in a claim as a limitation to identify or describe a particular material or product, the claim does not comply with the requirements of 35 U.S.C. 112, second paragraph. See *Ex parte Simpson*, 218 USPQ 1020 (Bd. App. 1982). The claim scope is uncertain since the trademark or trade name cannot be used properly to identify any particular material or product. A trademark or trade name is used to identify a source of goods, and not the goods themselves. Thus, a trademark or trade name does not identify or describe the goods associated with the trademark or trade name. In the present case, the trademark/trade name is used to identify/describe a steelmaking process and, accordingly, the identification/description is indefinite.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1, 2, 5-7, 11-13, 17-19 and 21 are rejected under 35 U.S.C. 102(b) as being anticipated by Vallomy (US 6,438,154 B2).

Vallomy anticipates the claimed invention. Vallomy teaches processing liquid slag as shown below in Fig. 1:

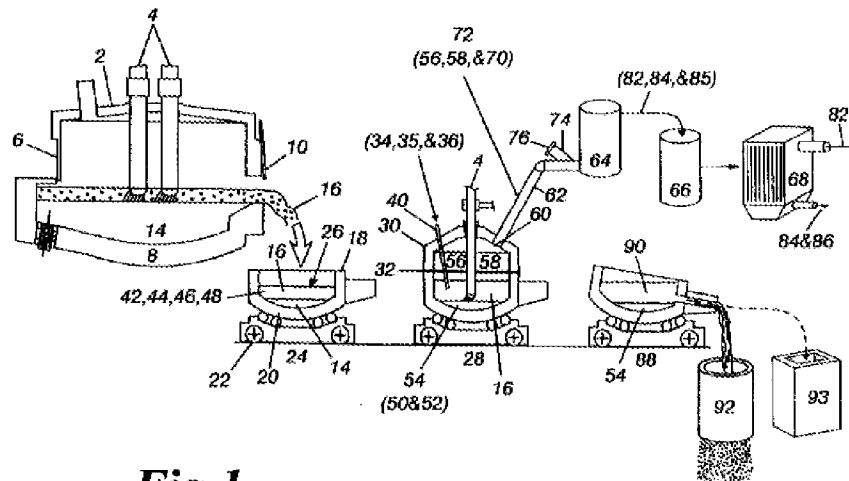


Fig. 1

CaO, SiO₂ and FeO are part of the slag (column 7, lines 5-7). Iron is reduced to (column 5, lines 52 and 53), and the treated slag is decanted (column 6, lines 36 and 37). Regarding Claim 2, the slag component of the feed is 73% (column 7, lines 50-55). Regarding Claim 5, the nonferrous component of the slag is 61%. Regarding Claim 6, the process is integrated. Regarding Claim 7, the granulated iron can be a charge

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material in iron or steel foundries (column 8, lines 47). Regarding Claim 11, the SiO_2 is preheated (column 4, line 64). Regarding Claims 12 and 13, the temperature is 1200 °C (lines 64 and 65). Regarding Claim 17, SiO_2 is added to the slag (line 65).

Regarding Claim 18, Vallomy teaches heating as an embodiment, which reads on not pretreating. Regarding Claim 19, the amount of SiO_2 is 20.2% (column 7, line 53).

Regarding Claim 21, the temperature of the slag is lowered (column 5, line 4).

Claims 1, 11, 14, 15, 17, 20, 24, 28, 29, 31 and 38 are rejected under 35 U.S.C. 102(b) as being anticipated by Contrucci et al (US 6,391,086 B1).

Contrucci et al anticipates the claimed invention. Contrucci et al teaches using electric steel plant slag in agglomerates (column 2, lines 24 and 25). The agglomerates are used to refine molten iron (column 1, lines 28 and 29). Regarding Claim 11, the agglomerates are heated (column 2, line 63). Regarding Claims 14, 15, 28 and 29, the temperature is 140 °C (Table 1). Regarding Claims 17 and 31, the agglomerates include fluxing materials (column 1, lines 58 and 59). Regarding Claims 20 and 34, lime is a fluxing material (column 2, line 13). Regarding Claim 24, agglomerates are cured, which reads on heating (line 63). Regarding Claim 38, the agglomerates include fines of iron ore and carbonaceous materials (column 1, lines 55-57).

Claims 1-5, 11-13, 17-22, 24, 26 and 27 are rejected under 35 U.S.C. 102(b) as being anticipated by GB 1,556,833.

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GB '833 anticipates the claimed invention. GB '833 teaches a method of working up waste slag from oxygen steel production (title). The slag is introduced into a reducing furnace atmosphere, and both iron and slag was collected (page 3, lines 47-62). Regarding Claims 2-4, the amount of slag is 80-97.5 parts by weight (line 32). Regarding Claim 5, the slag contains fluxing agents of about 81% (page 1, lines 19-25), which would yield at least 64.8%. Regarding Claim 17, the slag forming agent is schist (page 3, lines 50-52). Regarding Claim 18, the schist is not pretreated. Regarding Claim 19, the schist provides 2.5-20 parts by weight of aluminum silicate (line 31). Regarding Claim 20, the schist includes CaO (line 51). Regarding Claim 21, the slag is cooled (line 22). Regarding Claim 22, the slag is disintegrated (line 22). Regarding Claim 24, the slag and schist are heated in a crucible, and then the crucible was placed into a larger one, which reads on a pre-treatment unit (lines 53-55). Regarding Claims 26 and 27, the furnace is heated up to 1400 °C (line 55).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

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1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Vallomy as applied to Claim 1 above, further in view of Mishra in "Steelmaking Practices and Their Influence on Properties."

Vallomy discloses the invention substantially as claimed. However, Vallomy does not teach using iron produced with the slag and iron from at least one other iron making vessel for producing steel as in Claim 8. Mishra teaches that steelmaking furnaces use feeds including molten pig iron, scrap, and treated ladle materials (Fig. 1(a)). It would have been obvious to one of ordinary skill in the art at the time the invention was made that the iron produced by Vallomy would be used along with other

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iron materials, since Mishra teaches that steelmaking involves several different sources of iron.

Claims 1 and 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over JP 54032194 in view of Fukushima et al (US 6,334,885 B1).

JP '194 teaches converting molten converter slag into useful slag and recovering valuable metals in the molten slag by adding a flux to the molten slag after which the flux-added slag is heated to a specified temperature and blown with C_2H_2 gas to reduce metal oxides as well as reduce and remove P in the slag. JP '194 does not also specifically teach that the converter slag is from steelmaking process, Fukushima et al teaches solidifying steel making slag (abstract). It would have been obvious to one of ordinary skill in the art at the time the invention was made that the convert slag would come from a steelmaking process, since Fukushima et al teaches that steelmaking slag includes converter slag (Claim 3). Regarding Claim 9, phosphorus is removed.

Claims 9 and 35 are rejected under 35 U.S.C. 103(a) as being unpatentable over Contrucci et al as applied to claims 1 and 24 above, and further in view of JP '194.

Contrucci et al discloses the inventions substantially as claimed. However, Contrucci et al does not teach substantially partitioning phosphorus as claimed. JP '194 is applied as discussed above. It would have been obvious to one of ordinary skill in the art at the time the invention was made to use the process of JP '194 in the process of Contrucci et al, since JP '194 teaches removing phosphorus in the slag.

Claims 9, 10 and 36 are rejected under 35 U.S.C. 103(a) as being unpatentable over Contrucci et al as applied to Claims 1 and 24 above, further in view of applicant's admitted prior art.

Contrucci et al discloses the invention substantially as claimed. However, Contrucci et al does not teach removing phosphorus as in Claim 9, a HIs melt process as in Claim 10 or the ratio of phosphorus in Claim 36. Applicant discloses that the steelmaking slag in the form of fines can be used as a feed material that is supplied directly to a direct smelting vessel operating in accordance with the HIs melt process (page 4, lines 19-23). Ninety to 95% of the phosphorus fed to the HIs melt pilot plant vessel reported to the slag (lines 13-15). It would have been obvious to one of ordinary skill in the art at the time the invention was made that the slag fines produced in Contrucci et al could be used in the HIs melt process disclosed by applicant, since applicant discloses that steelmaking slag fines are used, and the HIs melt process has a more oxidizing slag, which results in extremely effective partitioning of phosphorus to the slag (lines 10-13).

Claim 37 is rejected under 35 U.S.C. 103(a) as being unpatentable over Contrucci et al as applied to claim 24 above, and further in view of Dry et al (US 6,939,391 B2) and applicant's admitted prior art.

Contrucci et al discloses the invention substantially as claimed. However, Contrucci et al does not teach partitioning phosphorus to the slag by maintaining the

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slag temperature and the amount of FeO in the slag as claimed. Applicant discloses that the steelmaking slag in the form of fines can be used as a feed material that is supplied directly to a direct smelting vessel operating in accordance with the Hlsmelt process (page 4, lines 19-23). Applicant further discloses that the Hlsmelt process has a more oxidizing slag which results in extremely effective partitioning of phosphorus to the slag, e.g. 90-95% (page 4, lines 10-14). Dry et al teaches the Hlsmelt process (column 2, line 41) including controlling the level of carbon to FeO levels of less than 5% in the slag (column 3, lines 55-59). The temperature is 1450-1550 °C (column 7, line 19). It would have been obvious to one of ordinary skill in the art at the time the invention was made to use the process taught by applicant's disclosure and Dry et al with the process of Contrucci et al, since applicant discloses that steelmaking slag fines are used, and the Hlsmelt process has a more oxidizing slag, which results in extremely effective partitioning of phosphorus to the slag (lines 10-13).

Claims 21 and 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Contrucci et al as applied to claims 1 and 17 above.

Contrucci et al discloses the invention substantially as claimed. However, Contrucci et al does not specifically teach cooling the slag as in Claim 21. It would have been obvious to one of ordinary skill in the art at the time the invention was made that the slag would be cooled, since Contrucci et al teaches that the slag as a particle size, and it is well known that slag produced in electric furnaces is originally a liquid.

Regarding Claim 22, it would have been obvious to one of ordinary skill in the art at the

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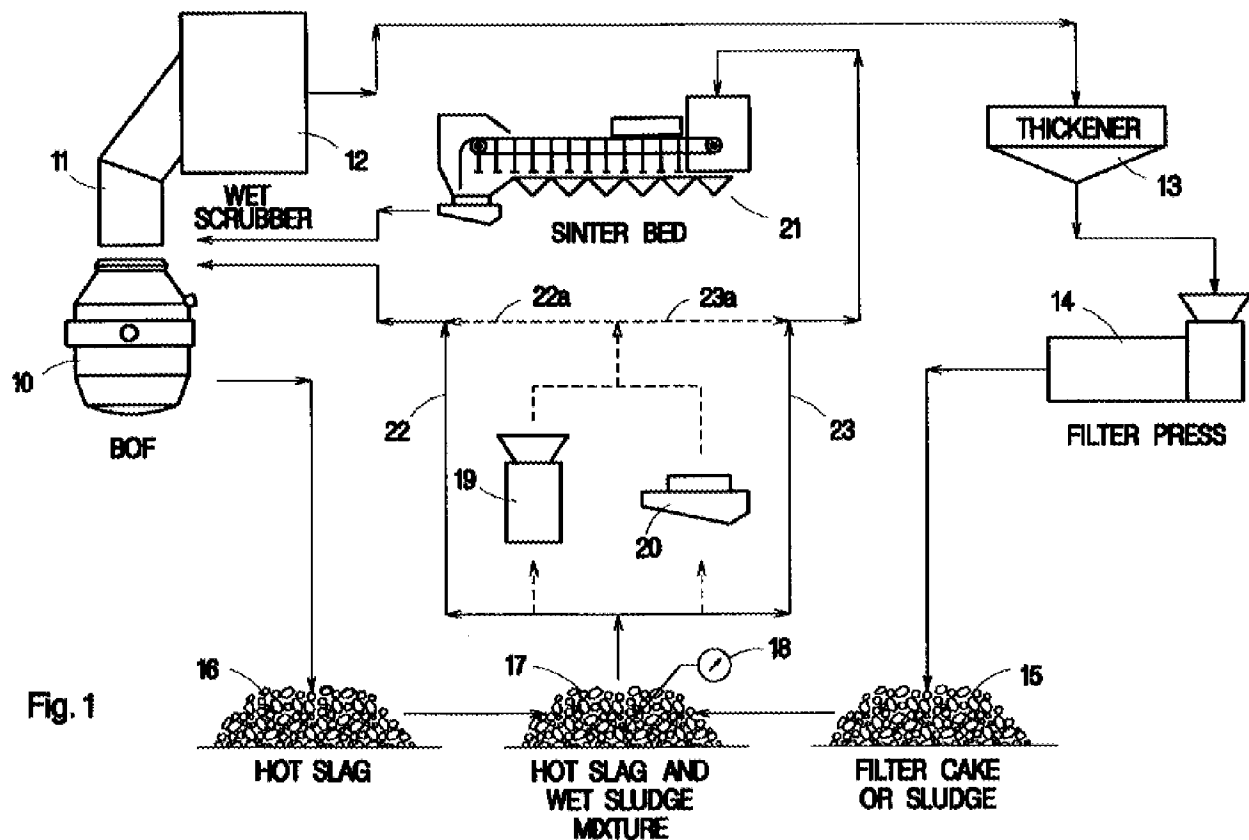
time the invention was made that the slag was reduced, since the slag has a particle size of at 1 mm or 6 mm (column 1, lines 36 and 37).

Claims 7 and 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over GB '833 as applied to claim 1 above, and further in view of Mishra.

GB '833 discloses the invention substantially as claimed. However, GB '833 does not teach using the iron produced in step (b) as at least part of the ferrous feed material for producing steel in step (a) as in Claim 7 or teach using iron produced with the slag and iron from at least one other iron making vessel for producing steel as in Claim 8. Mishra teaches that steelmaking furnaces uses feeds including molten pig iron, scrap, and treated ladle materials (Fig. 1(a)). Regarding Claim 7, it would have been obvious to one of ordinary skill in the art at the time the invention was made that the pig iron produced in GB '833 (page 5, line 7) could be used to produce steel, since Mishra teaches that pig iron is a feed material in steelmaking. Regarding Claim 8, it would have been obvious to one of ordinary skill in the art at the time the invention was made that the iron produced by GB '833 would be used along with other iron materials, since Mishra teaches that steelmaking involves several different sources of iron.

Claims 1-5, 9, 11, 16, 17, 19-22, 24, 30, 31 and 33-35 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lynn et al (US 6,383,250 B1).

Lynn et al teaches a process of making a steel revert (title) as shown below in Fig. 1:



The hot slag is from steel making (column 4, line 20). Lynn et al does not teach producing molten iron but does teach producing steel (column 1, line 10). It would have been obvious to one of ordinary skill in the art at the time the invention was made that steel reads on molten iron, since steel is an alloy of iron. Regarding Claims 2-5, the ratio of slag to sludge is 0.05:1 to 10:1 (column 5, lines 23 and 24). It would have been obvious to one of ordinary skill in the art at the time the invention was made that Lynn et al reads on the claimed range, since in the case where the claimed ranges overlap or lie inside ranges disclosed by the prior art, a *prima facie* case of obviousness exists. See MPEP § 2144.05. Lynn et al prefers 1:1 (line 27); according to MPEP § 2141.03, a prior art reference must be considered in its entirety, i.e. as a whole, including portions that

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would lead away from the claimed invention. Regarding Claims 5 and 31, TABLE 1 shows SiO_2 , CaO , MgO and Al_2O_3 in the slag as 65.2% (column 6). Regarding Claims 11 and 24, pretreating is done in sinter bed 21. Regarding Claims 16 and 30, Lynn et al teaches using a wet scrubber to produce sludge (Fig. 1). Regarding Claims 17, 20 and 34, lime is added (column 4, line 27). Regarding Claim 21, the slag is cooled, since it is not molten (column 6, lines 2-4). Regarding Claim 22, the slag is crush screened (column 6, line 21). Regarding Claims 9 and 35, phosphorus is trapped in the slag (column 6, lines 32 and 33). Regarding Claims 19 and 33, the amount of slag forming agent is 7.7% (TABLE 1).

Allowable Subject Matter

Claims 25 and 32 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is a statement of reasons for the indication of allowable subject matter: regarding Claim 25, the prior art of record does not disclose or suggest partially reducing the steelmaking slag. Regarding Claim 32, Contrucci et al teaches agglomerating with slag forming agents. Lynn et al teaches adding lime to the sludge and slag. However, neither Contrucci et al nor Lynn et al disclose or suggest adding slag-forming agents directly into the smelting vessel as claimed.

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Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to TIMA M. MCGUTHRY-BANKS whose telephone number is (571)272-2744. The examiner can normally be reached on M-F 8:00 am - 4:30 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Roy King can be reached on (571) 272-1244. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/T. M. M./
Examiner, Art Unit 1793
27 April 2009

/George Wyszomierski/
Primary Examiner
Art Unit 1793